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4. TITLE AND SUBTITLE "Purchase of a 200 MHz FT-NMR Spectrometer		5. FUNDING NUMBERS 61102F 2303/A3	
6. AUTHOR(S) Dr. Alan P. Marchand			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Department of Chemistry University of North Texas NT Station, Box 5068 Denton, TX 76203-5068		8. PERFORMING ORGANIZATION REPORT NUMBER 90-0602	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) AFOSR/NC Bolling AFB, Washington, D. C. 20332-6448		10. SPONSORING/MONITORING AGENCY REPORT NUMBER AFOSR-89-0109	
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12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release: Distribution is unlimited mega hertz		12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) The Chemistry Department, University of North Texas, was granted funds from AFOSR in the amount of \$50,000 which was applied to the purchase of a Varian Gemini 200 high-field (200 MHz) Fourier transform (FT) nuclear magnetic resonance (NMR) spectrometer. This routine instrument, used for observation of ¹ H and ¹³ C nuclei, has been used continuously since its arrival to improve the efficiency of currently funded DoD research that involves: (i) synthesis of new high energy/high density solid and liquid hydrocarbon fuels, (ii) synthesis of new energetic materials, and (iii) synthesis of isotopically labeled amines and organoammonium nitrate salts. These projects have received generous financial support from the U. S. Air Force and Army. In addition, the availability of this new NMR instrument has provided expanded opportunities for research on: (i) polysilylpolynes and polysiloxyalkynes that are of interest as potential new semiconductors, photoresists, and ceramic precursors and (ii) design and analysis of anionic polymerization initiators for the synthesis of improved elastomers. Finally, the new 200 MHz NMR instrument has provided new opportunities for hands-on experience with high-field NMR for non-NMR spectroscopists, thereby affording important experience for the education and training of future chemists.			
14. SUBJECT TERMS Nuclear Magnetic Resonance Spectrometer, Nuclear Instrumentation, organic compounds		15. NUMBER OF PAGES 22	
		16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UL (unlimited) SAR (same as report)

COMPLETED PROJECT SUMMARY

TITLE: Purchase of a 200 MHz FT NMR Spectrometer

PRINCIPAL INVESTIGATOR: Professor Alan P. Marchand
Department of Chemistry
University of North Texas
Denton, TX 76203-5068

INCLUSIVE DATES: 1 December 1988 - 30 November 1989

CONTRACT/GRANT NUMBER: AFOSR-89-0109

COSTS AND FY SOURCE: \$50,000, FY89

SENIOR RESEARCH PERSONNEL: Members of the Chemistry Faculty, Department of Chemistry, University of North Texas

JUNIOR RESEARCH PERSONNEL: Postdoctoral Research Associates and Graduate Students, Department of Chemistry, University of North Texas

ABSTRACT OF OBJECTIVES AND ACCOMPLISHMENTS:

The Department of Chemistry, University of North Texas was granted funds from the Air Force Office of Scientific Research in the amount of \$50,000 which was applied to the purchase of a Varian "Gemini 200" high-field (200 MHz) Fourier transform nuclear magnetic resonance (FT-NMR) spectrometer. This routine instrument, used for observation of ^1H and ^{13}C nuclei, has been used continuously since its arrival to improve the efficiency of currently funded DoD research that involves: (i) synthesis of new high energy/high density solid and liquid hydrocarbon fuels, (ii) synthesis of new energetic materials, and (iii) synthesis of isotopically labeled amines and organoammonium nitrate salts. These projects have received generous financial support from the U. S. Air Force and the U. S. Army. In addition, the availability of this new NMR instrument has provided expanded opportunities for research on: (i) polysilylpolyyne and polysiloxyalkynes that are of interest as potential new semiconductors, photoresists, and ceramic precursors and (ii) design and analysis of anionic polymerization initiators for the synthesis of improved elastomers. Finally, the new 200 MHz NMR instrument has provided new opportunities for hands-on experience with high-field NMR for non-NMR spectroscopists, thereby affording important experience for the education and training of future chemists.

FINAL REPORT

"PURCHASE OF A 200 MHz FT-NMR SPECTROMETER"

AFOSR-89-0109

Principal Investigator: Dr. Alan P. Marchand

Department of Chemistry, University of North Texas, Denton, TX 76203-5068

Date Submitted: April 16, 1990

The views, opinions, and/or findings contained in this report are those of the authors and should not be construed as an official Department of the Air Force position, policy, or decision, unless so designated by other documentation.

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INTRODUCTION

The Department of Chemistry, University of North Texas was granted funds from the Air Force Office of Scientific Research in the amount of \$50,000 which was applied to the purchase of a Varian "Gemini 200" high-field (200 MHz) Fourier transform nuclear magnetic resonance (FT-NMR) spectrometer. This routine instrument, used for observation of ^1H and ^{13}C nuclei, has been used continuously since its arrival to improve the efficiency of currently funded DoD research that involves: (i) synthesis of new high energy/high density solid and liquid hydrocarbon fuels, (ii) synthesis of new energetic materials, and (iii) synthesis of isotopically labeled amines and organoammonium nitrate salts. These projects have received generous financial support from the U. S. Air Force and the U. S. Army. In addition, the availability of this new NMR instrument has provided expanded opportunities for research on: (i) polysilylpolyyne and polysiloxyalkynes that are of interest as potential new semiconductors, photoresists, and ceramic precursors and (ii) design and analysis of anionic polymerization initiators for the synthesis of improved elastomers. Finally, the new 200 MHz NMR instrument has provided new opportunities for hands-on experience with high-field NMR for non-NMR spectroscopists, thereby affording important experience for the education and training of future chemists.

INSTRUMENT PURCHASE AND INSTRUMENT USE REPORTS

Purchase of the Varian Gemini 200 FT-NMR Spectrometer. The successful open market bidder was Varian Associates, Inc., who provided the Gemini 200 FT-NMR spectrometer at a total cost of \$144,100. The non-automated open market purchase order (order no. 90524) is appended (see APPENDIX I).

The necessary funds were provided by two sources: (i) Air Force grant no. AFOSR-89-0109 (\$50,000) and (ii) the State of Texas (\$94,100). The instrument was delivered to the Department of Chemistry, University of North Texas on June 21, 1989. Subsequently, the instrument was installed by personnel from Varian Associates, and delivery was accepted formally by the University on August 5, 1989.

Instrument Use Report. NMR use reports have been generated for three time periods: (i) 8/5-31/89, (ii) 9/1/89-12/31/89, and (iii) 1/1/90-4/9/90 (see APPENDIX II). In these reports, individual members of the Chemistry faculty are identified by name, and their use of the Gemini 200 FT-NMR spectrometer is documented by total hours of instrument time used during the specified time period and also as a percentage of total time available. It should be noted that "productive time" during the period 9/1/89 through 4/9/90 exceeded 70% of total time available, and instrument downtime has been minimal during this period.

Finally, it should be noted that the use of the Gemini 200 FT-NMR spectrometer in connection with Dr. Marchand's DoD funded research projects accounted for 1,212 hours of the total 3,803.3 hours of productive instrument time. Thus, 31.9% of productive instrument time has been devoted exclusively to DoD funded research projects since the Gemini 200 NMR spectrometer was placed in service.

APPENDIX I



NON-AUTOMATED
OPEN MARKET PURCHASE ORDER

303-02-007
11/85

SEE REVERSE SIDE FOR
INVOICING INSTRUCTIONS

PREPAY ALL CHARGES

SHOW THESE NOS. ON ALL
PAPERS AND PACKAGES

ORDER NO. 90524
REQN NO. 752-9-07990-H

ORDER DATE 5-5-89 PAGE 1

VENDOR

VID # 1-94-235-9345-800
VARIAN ASSOCIATES, INC.
611 HANSEN WAY, D041
PALO ALTO, CA 94303

ALL TERMS AND CONDITIONS
SET FORTH IN OUR BID
INVITATION BECOME A PART
OF THIS ORDER

VENDOR GUARANTEES MER-
CHANDISE DELIVERED ON
THIS ORDER WILL MEET OR
EXCEED SPECIFICATIONS IN
THE BID INVITATION.

FOR AGENCY USE ONLY

INVOICE (IN QUINTUPLICATE) TO AGENCY BELOW

NORTH TEXAS STATE UNIVERSITY
CONTROLLERS OFFICE
P.O. BOX 13767, N.T. STATION
DENTON, TEXAS 76203

DESTINATION OF GOODS IF DIFFERENT FROM ABOVE

NORTH TEXAS STATE UNIVERSITY
CENTRAL RECEIVING WAREHOUSE
2310 I 35E NORTH
DENTON, TEXAS 76201

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	EXTENSION
490-68	INSTALLMENT PURCHASE QUOTATION NO. <u>9-56DF-766.</u>				
1.	FOURIER TRANSFORM NUCLEAR MAGNETIC RESONANCE SPECTROMETER, TO MEET OR EXCEED THE FOLLOWING MIN. SPECS.: I.. SCOPE: THE SPECTROMETER SUPPLIED SHALL BE AN NMR (NUCLEAR MAGNETIC REAONANCE) SPECTROMETER OPERATING AT A FIELD STRENGTH OF 47.5 KILOGAUSS (KG) AND CONSISTING OF THE FOLLOWING: OPERATING CONSOLE W/DATA SYSTEM, SUPERCONDUCTIVE MAGNET, VARIABLE TEMPERATURE PROBE, SOFTWARE, MANUALS, AND ALL NECESSARY OPERATING SUPPLIES. II. SYSTEM PERFORMANCE: THE SPECTROMETER SHALL BE CAPABLE OF PRODUCING HIGH-QUALITY (1)H AND (13)C SPECTRA, BOTH FOR ROUTINE AND RESEARCH PURPOSES. THE SELLER SHALL FURNISH SUCH DATA AS NECESSARY TO ESTABLISH THE FOLLOWING PERFORMANCE MINIMUMS: A. <u>FIELD STRENGTH</u> 47.5 KG (SUPERCONDUCTING MAGNET W/51 MM BORE) B. <u>FREQUENCY RANGE</u> 1(H) OBSERVATION AT 200 MHZ (13)C OBERSERVATION AT 50 MHZ 5 MM SWITCHABLE (1)H TO 13C	1	CYS	144100.00	\$144,100.00
CONTINUED/sfh					

FOB DESTINATION CASH DISCOUNT -0- % DAYS

FAILURE TO DELIVER—If the contractor fails to deliver these supplies by the promised delivery date or a reasonable time thereafter, giving acceptable reasons for delay, or if supplies are rejected for failure to meet specifications, the State reserves the right to purchase specified supplies elsewhere, and charge the increase in price and cost of handling, if any, to the contractor. No substitutions nor cancellations permitted without prior approval of the State Purchasing and General Services Commission.

IN ACCORDANCE WITH YOUR BID PROPOSAL, SUPPLIES MUST
BE PLACED IN THE DEPARTMENT RECEIVING ROOM IN
120 DAYS ARO DAYS FROM RECEIPT OF ORDER

The State of Texas is exempt from all Federal Excise Taxes.

STATE AND CITY SALES TAX EXEMPTION CERTIFICATE: The undersigned claims an exemption from taxes under Chapter 20, Title 122A, Revised Civil Statutes of Texas, for purchase of tangible personal property described in this number order, purchased from contractor and/or shipper listed above, as this property is being secured for the exclusive use of the State of Texas.

STATE PURCHASING AND
GENERAL SERVICES COMMISSION

BY

PURCHASING DIVISION
AUSTIN, TEXAS 78711

STATE PURCHASING & GENERAL SERVICES COMMISSION

PURCHASING DIVISION - AUSTIN, TEXAS 78711

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Item No	Item and Description	Quantity	Unit	Make/Model	Unit Price	Extensit
	<p><u>C. Resolution</u></p> <p>$\leq 0.2\text{Hz } ^1\text{H}$ (1% ODCB) $\leq 0.2\text{Hz } ^{13}\text{C}$, (ASTM decoupled dioxane)</p> <p>D. $\geq 30:1$ ^1H, 0.1% ethylbenzene, 5 mm switchable probe $\geq 35:1$ ^{13}C, 60% C_6D_6 in dioxane, 5 mm switchable probe All above capabilities to be available on a single probe.</p> <p><u>E. Spinning Sidebands</u></p> <p>$\leq 1\%$ ^1H, 5 mm $\leq 1\%$ ^{13}C, 5 mm</p> <p><u>F. Lineshape</u> (5mm, ^1H)</p> <p>$\leq 10\text{Hz}$ linewidth at 0.55% amplitude level $\leq 25\text{Hz}$ linewidth at 0.11% amplitude level</p> <p><u>G. Observe Pulse Power</u> (90° Pulse)</p> <p>≤ 35 microseconds, ^1H, 5 mm ≤ 25 microseconds, ^{13}C, 5 mm</p> <p><u>H. Observe Offset Range</u></p> <p>± 50 kHz in 0.1 Hz steps</p> <p><u>I. Decoupler Offset Range</u></p> <p>± 50 kHz in ≤ 0.1 Hz steps</p> <p><u>J. Lock System</u></p> <p>2H internal lock: minimum lock concentration of 25% CDCl_3 in 5 mm broadband probes</p> <p>Computer controlled automatic locking with 5 ppm capture range</p> <p><u>K. Filters</u></p> <p>3-pol^e Butterworth, 3 or 15 kHz fixed</p>					

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Item No	Item and Description	Quantity	Unit	Make/Model	Unit Price	Extensic
L.	<u>A/D Converter</u> 12 bit resolution; 25,000 sample pairs per second sampling rate					
M.	<u>Acquisition Time</u> 1 millisecond to 100 seconds in 1 milli-second steps					
N.	<u>Spectral Width</u> Up to 23 kHz with quadrature phase detection					
O.	<u>Variable Temperature</u> -150°C to +200°C, computer controlled					
III.	ANALOG AND RF SYSTEM					
A.	<u>Magnet</u> 1. 47.5 kG, fully persistent: nominal field decay 0.1 ppm/hr 1H 2. 51mm bore 3. Low cryogenic loss design: boil off rates (room temerature 20°C): He ≤ 0.31 l/day N ₂ ≤ 2.5 l/day 4. Dewar capacity: 28 liters He 35 liters N ₂ 5. 80 day liquid He refill interval 6. 14 day liquid N ₂ refill interval					
B.	<u>Operating Console</u> The console must include the following features and facilities: 1. Lock, ovserve and decoupling frequentcies synthesized from one master clock 2. Deuterium heteronuclear lock a. Pulse interal b. Automatic lock 3. Observe RF system a. All frequencies to be derived from one source in the broadband mode					

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	b. Selection of output frequency, RF amplifiers and filters to be automatic with observe nucleus selection c. Output gateable and phase shiftable by computer control 4. Spin decoupler frequency, phase, and gating under computer control 5. Status lights on the front panel to monitor VT regulation, and lock 6. Front panel indicators to show spin rate, VT temperature and N ₂ flow 7. Console automation including hardware and software to perform these functions: Autoshim Automatic sample spinning Automatic sample eject/loading Automatic selection of receiver gain Autolock Autophase Digital decoupling C. <u>Probe</u> 1. Tuneable through control rods accessible at bottom of probe 2. Operator to be able to observe the tuning indicator while adjusting the probe 3. Probe removable without disturbing the upper sample guide and spinning mechanism 4. Built-in VT capability of -150°C to +200°C 5. Probe to include 2H internal lock capability D. System Utility and Environmental Requirements 1. Console line voltage: 117 Vac, single phase, 50/60 Hz 2. Power consumption: 1.5 kVA maximum 3. Ambient temperature limits: 17°C to 24°C 4. Relative humidity: 20% to 80% noncondensing					

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Page 5 of 14 Page.Bid Opening
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IV.	DATA SYSTEM REQUIREMENTS					
A.	<u>General Type</u>					
	Must be designed with two separate CPU's one for data acquisition and one for data processing. It must be possible to perform any data manipulation required while aquisition is in progress.					
B.	<u>Data System Specifications</u>					
	The data system shall have as a minimum the following charateristics and specifications					
1.	<u>Host System</u>					
a.	<u>Computer</u>					
	Independent CPU with 32 bit registers and arithmetic operations and 16 bit data transfer; 64K-bytes ROM; 1.25 M bytes RAM (direct addressing to 4M bytes); an industry-standard-bus system interconnect; I/O-channel interface for peripheral control					
b.	<u>System Bus</u>					
	Industry standard 32 bit					
c.	<u>Disk Interface</u>					
	DMA controller to system bus to standard bus					
d.	<u>Interfaces</u>					
	Two RS-232C serial ports for optional printer/plotters; AASCII coded; asynchronous; one Centronics port					
2.	<u>Acquisition System</u>					
a.	<u>Computer</u>					
	Independent CPU with 32 bit					

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	registers and arithmetic operations and 16 bit data transfer; 64K-bytes ROM; 256K-bytes RAM; an industry- standard-bus system interconnect; I/O channel interface to pulse sequence controller b. <u>Data Table</u> 128K bytes RAM; 60K words (16 bit) or 30K words (32 bit) c. <u>Data Acquisition processor</u> 32 bit sum to memory with scaling; 200 KHz rate d. <u>Pulse Controller</u> Multiplexed 36 bit pulse sequence controller with hardware timing; 100 nanosecond resolution; hardware and software; looping; unlimited steps e. <u>A/D Converter</u> 12-bit resolution f. <u>System Bus</u> Industry standard, 32 bit g. <u>Disk Interface</u> DMA controller 3. <u>Standard Information Storage System</u> a. <u>Hard Disks</u> Winchester disk storage, 20 M byte minimum; second Winchester disk optional b. <u>Flexible Disk</u> 5 1/4 inch flexible disk; double-sided, double density; 1 M byte capacity (640 k formatted) c. <u>Disk Controller</u> To control up to two hard disks and one flexible disk d. <u>System Bus</u> Industry standard; 8 bit data transfer 4. <u>Operator Interface</u> a. <u>CRT Display</u> 13 inch, 16 color raster scan display; 576 x 434 pixel resolution Shall come with table; 69" L x 38" D x 28" H b. <u>Graphics Processor</u> Independent display processor for vector to-graphics conversion; dedicated 128K byte display-refresh memory					

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Item No	Item and Description	Quantity	Unit	Make/Model	Unit Price	Extension
	<p>c. <u>Keyboard</u> 65-key, solid state freestanding keyboard with full ASCII character set and dedicated microprocessor controller</p> <p>d. <u>User Assigned Knobs</u> Five continuous assignable display controls for adjustment of FID, spectrum and integral display, phase, cursor position, and threshold levels; shaft-encoded, dedicated microprocessor controller</p> <p>V. STANDARD SOFTWARE The following software shall be provided:</p> <p>A. <u>System Features</u> Operating system <ul style="list-style-type: none"> - File oriented - Disk-based - Concurrent PASCAL Up to six concurrent operations <ul style="list-style-type: none"> - Plotting - Printing - Processing - Keyboard input - Knob input Screen-based display <ul style="list-style-type: none"> - Numeric and/or alphanumeric information - Independent memory - Screen refresh Automatic queuing <ul style="list-style-type: none"> - Plotting - Printing - Keyboard input Nine independent experiments with file space for: <ul style="list-style-type: none"> - Parameters Maximum arrayed parameters: 3 Total values per arrayed parameter: 18 - One or more FIDs Total 18 x 18 x 18 ID FIDs - One or more spectra Enter all information from keyboard Five programmable, continuously adjustable knobs </p> <p>B. <u>Data Storage and File Manipulation</u> Save and retrieve FIDs including: <ul style="list-style-type: none"> - 2D FIDs - Parameters and text file </p>					

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	<p>File-based data storage</p> <ul style="list-style-type: none"> - Subdivision of files unlimited - Display file directories including text information - Rename, delete, compress, and copy files - Perform digital display or printout contents of any file <p>C. <u>Data System Tools</u></p> <p>User-definable MACRO commands containing</p> <ul style="list-style-type: none"> - Commands - Selection of parameters <p>Pulse sequence programmability</p> <p>Full screen-based text editor</p> <p>D. <u>Pulse Sequence Programming</u></p> <p>User-programmable, PASCAL-based pulse sequence codes</p> <p>Hardware control:</p> <ul style="list-style-type: none"> - Transmitter - Decoupler - Receiver gating - Transmitter and decoupler phases - Decoupler modulation - Decoupler power level - Transmitter and decoupler frequencies <p>PASCAL statements</p> <ul style="list-style-type: none"> - Parameter-controlled branching - Looping - Decision making - Delay or pulse calculations <p>New parameters</p> <ul style="list-style-type: none"> - Create and use - Names <ul style="list-style-type: none"> Up to 6 letters User selectable - Parameters include: <ul style="list-style-type: none"> Pulses Frequencies Delays Integers Flags Names <p>Time/pulse controller</p> <ul style="list-style-type: none"> - Continuously reprogrammed - No known limit on number of pulses, delays or other events <p>Phase cycling</p> <ul style="list-style-type: none"> - Computationally-based - Unlimited number of different cycles <p>Different pulses</p> <p>Unlimited periodicity</p>					

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	Branching and looping <ul style="list-style-type: none"> - Transiet counter based - Different pulse sequence variants selectable on different scans Time events <ul style="list-style-type: none"> - Pulses, delays. etc. - Specifiable in 100 nsec increment (200 nsec minimum) - Automatic removal of pulses and events entered as zero E. <u>Data Processing</u> Fourier transformation 16-bit floating point Weighting <ul style="list-style-type: none"> Exponential (positive or negative) Gaussian Convolution-difference Singly or in combination Display FID <ul style="list-style-type: none"> - Real or imaginary - Weighted or unweighted Optimum resolution enhancement parameters <ul style="list-style-type: none"> - Computer estimated - 1D and 2D experiments Phasing <ul style="list-style-type: none"> - Manual - Rapid manual - Automatic 2D data <ul style="list-style-type: none"> - Single command transformation with or without weighting - Symmetrization along diagonal or median - "Rotation" by any angle Integrals <ul style="list-style-type: none"> - Up to 34 programmable integral reset points - Remove alternate integrals from display to display integrals of resonance only Linear and non-linear baseline correction Stacked or "white-washed" display mode <ul style="list-style-type: none"> - Up to 18 1D spectra simultaneous on screen - Horizontal and vertical offset between spectra: Specified by user or chosen automatically by computer Text labelling of displayed spectra for output to printer or plotter					

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Item No	Item and Description	Quantity	Unit	Make/Model	Unit Price	Extensic
	Plotting of up to 18 1D spectra with a single command					
F.	<u>2D Data Display and Plotting</u>					
	Color intensity maps					
	- 15 colors					
	- Each color represents power of two					
	- Interactive display					
	Cursor-selection of individual traces for display and plotting					
	Selected region expansion					
	Contour map					
	- User selectable					
	Number of contours (no limit)					
	Contour spacing					
	Stacked or "white-washed" plots					
	2D traces					
	- Manipulate with any 1D software as described above					
G.	<u>Printing and Display of Information</u>					
	Listings					
	- Parameters mnemonic or English-based					
	- Line listings: Peak heights and frequencies in Hz and PPM					
	- Integrals: Raw or normalized format					
	Text Display					
	- One-line, large-size, or full screen					
	- Use for prompting or experiment set-up assistance					
	Screen dump of graphics or alphanumerics					
H.	<u>Analysis Commands</u>					
	- Automatic region selection					
	- Find the largest integral in given area					
	- Find total integral of specified region					
	- Read total number of lines in specified region					
	- Read height and frequency of lines in a spectrum					
	- High-order baseline correction					
I.	<u>Macro Features</u>					
	- Arguments					
	- Conditional statements					
	- Return values to another macro					
	- Looping					
	- Input parameter values					

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Item No	Item and Description	Quantity	Unit	Make/Model	Unit Price	Extens:
	<ul style="list-style-type: none"> - Output results to screen, printer and/or plotter - Mathematics with numbers and parameters 					
J.	<u>Macro Library--Sample Macros</u> <ul style="list-style-type: none"> - Initialize parameters - Automatic proton spectrum - Automatic carbon spectrum with signal -to noise testing - ¹³C signal-to-noise test - ¹H signal-to-noise test - ¹H COSY - Automatic pulse width calibration - Automatic expansions of 1H spectrum - Vertical scale adjustment - Examine and reference TMS 					
K.	<u>Software Compatibility</u> All information stored on diskettes (FIDs, parameters, and text files) must be compatible with and accessible to software on a Varian VXR-4000 stand alone data station					
L.	<u>Software Updates</u> Corrections to software releases will be made free of charge					
VI.	DATA SYSTEM OPTIONS System shall be capable of adding the following options: Additional memory 2 Mbytes (3 Mbytes total memory including the standard 1 Mbyte memory board) Hard disks One of the following disks may be added: <ul style="list-style-type: none"> - 30 Mbyte Winchester disk - 80 Mbyte Winchester disk - 140 Mbyte Winchester disk Streaming Magnetic Tape Storage: Up to 16 Mbytes Modem RS-232 interface for Racal-type modem					

STATE PURCHASING & GENERAL SERVICES COMMISSION

PURCHASING DIVISION - AUSTIN, TEXAS 78711

Continuation
Page 12 of 14 PagesBid Opening : : : : : 3 P.M. 04-24 1989
Date : : : : :Requisition : : : : : 752- 9 07497
Number : : : : :**Bidder Must Fill in →**Name of : : : : : VARIAN ASSOC INC
Bidder : : : : :
(Return One Copy Unless Otherwise Requested)

Item No	Item and Description	Quantity	Unit	Make/Model	Unit Price	Extension
	<p>VII. <u>DELIVERY AND INSTALLATION</u></p> <p>Equipment shall be delivered, installed and set in place to create a turnkey system by mutual agreement with the ordering department. Delivery shall be scheduled and coordinated with contact person listed below. Contact person should also be contacted for site inspection if applicable. No authority is intended or implied that specifications may be amended prior to bid opening without written approval of the State Purchasing and General Services Commission.</p> <p><u>DELIVERY AND INSTALLATION LOCATION:</u> University of North Texas, Chemistry Department Masters Hall, Avenue C & Sycamore, Denton, Texas 76201. University's contact person: Ruthanne Thomas 817-565-3545.</p> <p>NOTE TO BIDDERS: INSTALLMENT PURCHASE INFORMATION:</p> <p>Bid total is for a two year installment purchase plan for the equipment listed. The installment purchase payments shall be billable with 68% to 71% due within thirty days of equipment delivery, 12 % to 14% due within thirty days of equipment installation. Remaining principal or buy out price to be paid after January 15, 1990.</p> <p>Bidder shall show installation and freight, deinstallation if applicable, the cash price, the installment payments, the time price differential charged, and the amount saved should the University of North Texas exercise the early buy out (pay off balance) payment.</p> <p>PAYMENT SCHEDULE:</p> <p>A. Cash Price (Principal Balance) <u>\$144,100.00</u> B. Time Price Differential of \$ <u>-0-</u> C. Total Deferred Purchase Price <u>\$144,100.00</u></p>					

STATE PURCHASING AND GENERAL SERVICES COMMISSION

PURCHASING DIVISION — AUSTIN, TEXAS 78711-3047

Continuation
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Bid Opening
Date 3 P.M. 04-24 19 89

Requisition
Number 752-9-07990-H

Bidder Must Fill In →

Name of
Bidder VARIAN ASSOC INC

(Return One Copy Unless Otherwise Requested)

Item No.	Item and Description	Quantity	Unit	Make/Model	Unit Price	Extension
	<p>First year installment payments: <u>\$100,000</u> within thirty days of equipment delivery. <u>\$44,100</u> remaining principal balance (buy out price) <u>\$19,100</u> within thirty days of equipment installation. <u>\$25,000</u> remaining principal balance (buy out price) Second year installation payment (final payment) to be paid within 30 days after January 15, 1990. <u>\$25,000</u> Amount Due.</p> <p>The University of North Texas will take clear title to the equipment upon the final installment or early buy out (pay off balance) payment.</p> <p>Note: The state retains the option of early purchase at anytime during the contract period, including at time of acceptance, by paying the outright purchase price or the principal amount remaining as shown on the payment schedule with buy out amount. There shall be no prepayment penalty. In the event funds are not appropriated by the Texas Legislature for periodic payments for the equipment included herein upon expiration of any future State Fiscal Year, the State of Texas may cancel, without penalty, the net remainder payments for the equipment for which no funds were appropriated by submitting to the vendor 30 day prior written notice.</p> <p>DE-INSTALLATION IF APPLICABLE:</p> <p>Vendor shall be responsible to remove and transport this equipment upon expiration or termination of the installment purchase if the equipment is not purchased due to cancellation without penalty should the legislature fail to provide appropriated funds for the equipment listed on the order. Title to the machines and equipment, any replacement or additions, taxes, ect. shall remain the responsibility of the vendor until the installment period is terminated or paid in full or until the early buy out (pay off balance) price is fully paid at which time the State of Texas shall take clear title.</p>					

STATE PURCHASING AND GENERAL SERVICES COMMISSION

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Continuation
Page 14 of 14 Pages

Bid Opening ****
Date ***** 3 P.M. 04-24 19 89

Requisition *****
Number ***** 752-9-07990-H

Bidder Must Fill in →

Name of *****
Bidder ***** VARIAN ASSOC INC

(Return One Copy Unless Otherwise Requested)

Item No.	Item and Description	Quantity	Unit	Make/Model	Unit Price	Extension
	<p>VII. WARRANTY</p> <p>WARRANTY FOR A PERIOD OF ONE YEAR TO INCLUDE ALL TRANSPORTATION, PARTS, LABOR AND FREIGHT CHARGES TO VENDORS CENTER IF REQUIRED.</p> <p>REFERENCE: VARIAN GEMINI-200 FT-NMR</p> <p>THIS CONTRACT IS SUBJECT TO CANCELLATION, WITHOUT PENALTY, EITHER IN WHOLE OR IN PART, IF FUNDS ARE NOT APPROPRIATED.</p> <p>POINT-OF-CONTACT: NAME: <u>DAVE VEA</u> PHONE: <u>(800) 231-8134</u></p> <p>LS/sfh</p>					

APPENDIX II

SUMMER 1989 UNT NMR USE REPORT
August 5, 1989 to August 31, 1989

	Gemini-200 w/o oper Percent =====		Gemini-200 with oper Percent =====		Gemini-200 TOTALS Total Percent =====	
Brady	0.00	0.00%	0.00	0.00%	0.00	0.00%
Conlin	0.00	0.00%	2.00	0.31%	2.00	0.31%
Cook (biochem)	0.00	0.00%	0.00	0.00%	0.00	0.00%
Dobson	0.00	0.00%	0.00	0.00%	0.00	0.00%
Jones	0.00	0.00%	0.00	0.00%	0.00	0.00%
Marchand	4.00	0.62%	18.00	2.78%	22.00	3.40%
Marshall/ Jacobson	0.00	0.00%	0.00	0.00%	0.00	0.00%
Richmond	0.00	0.00%	0.00	0.00%	0.00	0.00%
Schwartz	0.00	0.00%	0.00	0.00%	0.00	0.00%
Thomas	5.00	0.77%	0.00	0.00%	5.00	0.77%
Training	0.00	0.00%	0.00	0.00%	0.00	0.00%
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Productive Time	9.00	1.39%	20.00	3.09%	29.00	4.48%
Maintenance					1.00	0.15%
Idle					618.00	95.37%
Downtime					0.00	0.00%
Unaccounted for					0.00	0.00%

Non-productive time					619.00	95.52%
					=====	
TOTAL					648.00	100.00%

GEMINI-200
FALL 1989 UNT NMR USE REPORT
September 1, 1989 to December 31, 1989

	Gemini-200 w/o oper Percent =====		Gemini-200 with oper Percent =====		Gemini-200 TOTALS Total Percent =====	
Brady	0.00	0.00%	0.00	0.00%	0.00	0.00%
Brateman	0.00	0.00%	24.30	0.83%	24.30	0.83%
Conlin	978.60	33.42%	0.00	0.00%	978.60	33.42%
Cook (biochem)	0.00	0.00%	0.00	0.00%	0.00	0.00%
Dobson	0.00	0.00%	0.00	0.00%	0.00	0.00%
Jones	0.00	0.00%	0.00	0.00%	0.00	0.00%
Marchand	689.80	23.56%	0.00	0.00%	689.80	23.56%
Marshall/ Jacobson	0.00	0.00%	0.00	0.00%	0.00	0.00%
Norton	0.00	0.00%	0.50	0.02%	0.50	0.02%
Richmond	8.50	0.29%	0.00	0.00%	8.50	0.29%
Schwartz	287.00	9.80%	0.00	0.00%	287.00	9.80%
Thomas	63.90	2.18%	0.00	0.00%	63.90	2.18%
Training	29.10	0.99%	5.00	0.17%	34.10	1.16%
NMR Class (5620)	19.60	0.67%				
<hr/>						
Productive Time	2056.90	70.25%	29.80	1.02%	2086.70	71.27%
Maintenance					2.50	0.09%
Idle					0.00	0.00%
Downtime					0.00	0.00%
Unaccounted for					838.80	28.65%
Non-productive time					841.30	28.73%
<hr/>						
TOTAL					2928.00	100.00%

GEMINI-200
 SPRING 1990 UNT NMR USE REPORT
 January 1, 1990 to April 9, 1990

	Gemini-200 w/o oper Percent =====		Gemini-200 with oper Percent =====		Gemini-200 TOTALS Total Percent =====	
Brady	9.50	0.43%	0.00	0.00%	9.50	0.43%
Brateman	0.00	0.00%	0.00	0.00%	0.00	0.00%
Conlin	626.10	28.67%	0.00	0.00%	626.10	28.67%
Cook (biochem)	0.00	0.00%	0.00	0.00%	0.00	0.00%
Dobson	0.00	0.00%	0.00	0.00%	0.00	0.00%
Jones	0.00	0.00%	0.00	0.00%	0.00	0.00%
Marchand	500.20	22.90%	0.00	0.00%	500.20	22.90%
Marshall/ Jacobson	0.00	0.00%	0.00	0.00%	0.00	0.00%
Norton	0.00	0.00%	0.00	0.00%		
Richmond	116.20	5.32%	0.00	0.00%	116.20	5.32%
Schwartz	418.00	19.14%	0.00	0.00%	418.00	19.14%
Thomas	13.80	0.63%	0.00	0.00%	13.80	0.63%
Training	0.00	0.00%	3.80	0.17%	3.80	0.17%
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Productive Time	1683.80	77.10%	3.80	0.17%	1687.60	77.27%
Maintenance					0.00	0.00%
Idle					0.00	0.00%
Downtime					4.00	0.18%
Unaccounted for					492.40	22.55%
					<hr/>	
Non-productive time					496.40	22.73%
					<hr/>	
TOTAL					***** 2184.00	100.00%